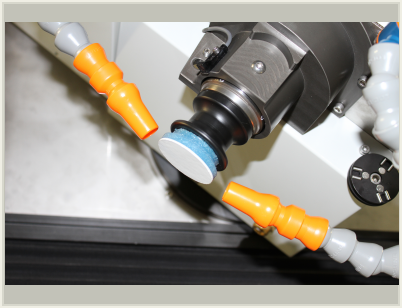
Figuring and Polishing Precision Optical Surfaces, Phase I

Completed Technology Project (2014 - 2014)

Project Introduction

The requirements for cost effective manufacturing and metrology of large optical surfaces is instrumental for the success of future NASA programs such as LISA, WFIRST and NGXO. Our plan in this Phase I effort would be to combine our UltraForm Finishing (UFF) (a sub-aperture compliant wheel and belt type polishing process for rapid material removal from the ground state to a finished optic), with our newly developed UltraSmooth Finishing (USF). USF is our sub- and mid- aperture conformal pad polishing process capable of larger area finishing and smoothing of mid-spatial frequency errors. The UFF rapidly removes residual grinding marks and sub-surface damage, while providing a robust solution for surface corrections on the required X-ray mandrels and cylindrical shells. Our USF process was initially developed for high speed finishing of hard ceramic plano components and is now producing impressive test results for smoothing of critical aspheric components. OptiPro's technologically advanced optical manufacturing capabilities, along with our strong university and industry partnerships, gives us a very strong team and a clear path towards developing and commercializing the platforms which solve the difficult challenges associated with the fabrication of these large complex mirrors and cylindrical shells. The proposed Phase I plan will include fabrication, test and delivery of a 0.25 meter precision mirror. The part geometry will be measured with OptiPro's "UltraSurf" a non-contact free-form measurement system. We envision that the work done during Phase I will be extended during Phase II to hyperbolic or elliptical shaped mirror surfaces with dimensions ranging from 1 to 2 meters. This research will position us with the information needed to develop the machine platforms needed for the fabrication and test of these large NASA mirrors, which could also be a Phase II deliverable.



Figuring and Polishing Precision Optical Surfaces Project Image

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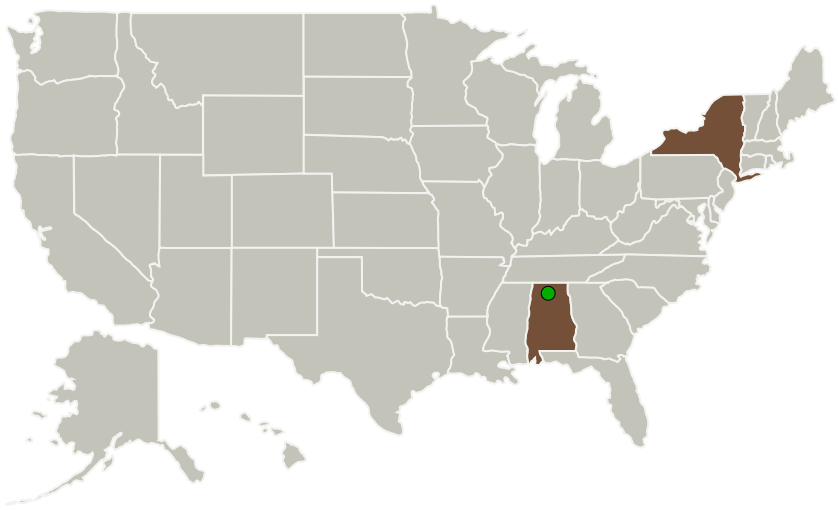
Primary U.S. Work Locations and Key Partners



Organizations Performing Work	Role	Type	Location
OptiPro Systems LLC	Lead Organization	Industry	Ontario, New York
Marshall Space Flight Center(MSFC)	Supporting Organization	NASA Center	Huntsville, Alabama

Primary U.S. Work Locations	
Alabama	New York

Project Transitions

June 2014: Project Start

December 2014: Closed out

Closeout Documentation:

- Final Summary Chart*(https://techport.nasa.gov/file/137692)*

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

OptiPro Systems LLC

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

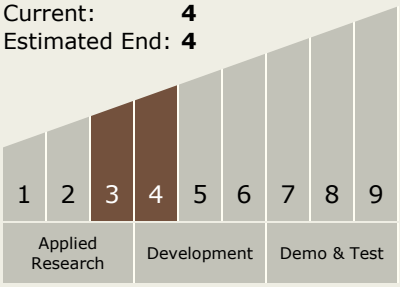
Carlos Torrez

Principal Investigator:

David Mohring

Technology Maturity (TRL)

Start: **3**
Current: **4**
Estimated End: **4**



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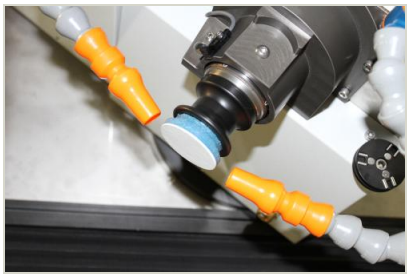
Images



Project Image
Figuring and Polishing Precision Optical Surfaces Project Image
(https://techport.nasa.gov/image/130613)

Technology Areas

Primary:

- TX08 Sensors and Instruments
  - TX08.2 Observatories
    - TX08.2.1 Mirror Systems

Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System